DOCUMENT RESUME

ED 139 983 CE 011 023

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TITLE Models for Individualizing Vocational-Technical Instruction.
PUB DATE Dec 74
NOTE 15p.; Paper presented at the American Vocational Association Convention (December 1974)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Educational Methods; Educational Strategies; *Individualized Instruction; *Instructional Design; Instructional Improvement; *Teaching Models; Technical Education; Trade and Industrial Education; *Vocational Education

ABSTRACT

Eight major instructional models and the basic strategies which define each of them are presented in this paper along with contrasts of the individualized instruction models with the "traditional" model of instruction (characterized by fixed-content, fixed-time, variable proficiency). The author notes that the models could be useful to industrial educators and other educators in modifying their teaching activities so that they can communicate with each other about the differences in the strategies and instructional models they use. Prior to discussion of the models, the author briefly discusses (1) the need for individualized instruction in vocational education and (2) three dimensions for classifying models: Content dimension, time dimension, and proficiency or competency level dimension. The description of the eight instructional models includes a discussion of the possibility of organizing an instructional program using any of the instructional models as cells of a matrix which would include all possible combinations of the content, time, and proficiency levels. A figure of the matrix is included. (SH)

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MODELS FOR INDIVIDUALIZING VOCATIONAL-TECHNICAL INSTRUCTION

by
David J. Pucel*

"What is individualized instruction?" "How does it differ from other models of instruction?" These are questions often raised by educators or people preparing to become educators.

The answers to these questions will frequently be different if you ask industrial arts teachers, trade and industrial education teachers or career education teachers. The reason is that their is not only one individualized instruction model but many. Each of which is reasonable for programs with certain basic objectives.

Every educator uses at least one instructional model which is the general framework within which instruction is planned. The model that is used is generally dependent upon the basic goals of the program. Programs with different goals, such as T&I and industrial arts programs, might and possibly should use different models.

This paper describes some possible models that industrial educators and other educators might use to modify their programs and to classify what they are doing so they can communicate with each other about the differences in the strategies and instructional models they use. It also contrasts the individualized instruction models with the "traditional" model.

The traditional model was designed to selectively educate people and, therefore, to selectively eliminate people from the schools. Students were taught as groups. Courses were developed with highly structured content and were presented within the school year or some other fixed period of time. Teachers presented the content to the students as a group when the majority of the students were ready for it.

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Those students who were ready earlier and those students who were not ready, received the content with the majority. All students progressed at the speed of the majority. Students were looked upon as either having "aptitude" to learn a particular type of content or not having it. A student who was not succeeding in arithmetic was often told that he lacked aptitude in arithmetic. This condition was viewed as a fact which was not worth trying to change. Aptitude was defined in terms of a person's potential or capacity to learn. It was assumed that if a student could not grasp the material within the time period allotted by the instructor, his aptitude or potential to deal with that type of material was low. Therefore, it was not worth continuing to work with the individual on that subject matter. The student could always leave school and find a job.

Over the years our society has changed. The complexities of society have manifested themselves in increasingly higher job entry skill levels. Therefore, training and education have become more complex. Society can no longer absorb large numbers of people who leave the schools with minimal skills and expect informal educational mechanisms to fill the education gap.

In order to compete for a productive role in society, people are demanding access to all facets of public instruction, academic and occupational. Upon gaining original access to education, people are also demanding a flexible educational system which will allow them to return in the future to pursue more study pertaining to their original goal or some new goal.

How can the educational community satisfactorily deal with these new challenges? Some educators say we should do what we have always done but do it better. However, more and more people are beginning to believe that the solution is not that simple. They are beginning to believe that the educational structure and management must become more flexible. Instructional models must be developed to meet the varied educational objectives of society.

One mechanism or approach to revitalizing the educational system is individualized instruction. Individualized instruction attempts to adapt the educational program to allow for individual differences among students. It is aimed at assisting the student to develop from the point he is at currently to a place where he needs to be in the future.

Few industrial educators would disagree with the need for individualizing instruction to allow students to achieve relevant goals. There is considerable disagreement, however, in how educators define individualized instruction and in how they define relevant goals. Some educators define individualized instruction in terms of the development of a variety of different methods of presenting content to students so that they can select a method that best suits their personal learning styles. Although this certainly could be used as a method of defining individualized instruction, it does not provide a basis for making a meaningful distinction between what are considered to be individualized and non-individualized programs. Such a definition does not imply the changes in curriculum design and administrative procedures which underlie meaningful variations among individualized programs. Any good instructor will try to adapt to the learning styles of students regardless of the model being used.

The key to determining the type of instructional model to be used is also not the subject matter to be taught. In fact, it is reasonable that the same subject matter could be taught in different programs using different models depending upon the goals of the programs. For example, one can teach metal working in an industrial arts program or in a trade and industrial education program. Usually the trade and industrial education metal working program would be aimed at developing certain prescribed skills related to metal working, based on the needs of industry. The industrial arts program might have the objective of acquainting students with metal working skills and knowledge. Although both of these programs are dealing with the same subject matter content, they could justifiably be taught from two quite different instruction models in order to meet their objectives.

The identification of the content to be included in a program just provides the raw materials to be included in courses. The next step is to determine how these raw materials should be processed to make them most easily understood by the students in a manner consistent with the goals of the course. I have developed a scheme for identifying general instructional models which outlines different strategies that can be used to plan courses and manage classrooms. Many of the models can be categorized as individualized instruction models.

The following discussion describes the major instructional models and the basic strategies which define each of them. It also contrasts the individualized instruction models with the "traditional" model of instruction. Each of the models is useful, depending upon how we view content selection, instructional time, and expected student content mastery within the instructional setting. Content selection refers to what content students will study during a course or program, time refers to the length of time students are given to learn the content, and proficiency level refers to how much skill or knowledge a person is expected to develop relative to a task before moving on to another. An instructional program can be developed to try to insure that all students learn similar content or it can be developed to allow students to select their own content. An instructional program can be developed to insure that all students work on a task for the same period of time, or it can be developed to allow students to work on a task for different periods of time. An instructional program can be developed to insure that all students develop a minimal level of proficiency on a task (master the task) or it can be developed to allow different students to develop different levels of proficiency.

Lets look at each of these dimensions for classifying models in more detail and then we will look at the models. The content dimension is viewed quite differently depending upon the purpose for teaching the course. If it is felt that the content to be taught is composed of basic skills which all students must study in order

to successfully function in the future, then the fixed-content scheme is used. Fixed-content means that the students are not allowed to select what they are going to study after they have entered a program. They might select the method of studying the content but not the content. The content is fixed by the educational system (usually the instructor) and students are expected to study the content by the time they complete the program. Courses contained in a vocational program are generally fixed-content courses. For example, once students indicate that they wish to become a machinist and enter the program, they must study the courses included in the program and the specified content contained in each course. The content is determined by examining what a machinist is expected to be able to do on the job.

If the exact content students should study is not important, the variable-content mode can be used. Since it is not essential that students study specifics from the body of content but that they achieve some general familiarity with the content, students are allowed to select content from a wide range of content related to the program or course being taught. An example can be drawn from a career education course aimed at familiarizing students with a variety of occupations. The purpose is to familiarize students with a variety of occupations, but it is not important that all students study the same occupations. Therefore, students are allowed to select the occupations they wish to study. Some industrial arts programs are operated in a similar way. Students are allowed to make projects in a particular shop but the projects do not all require the same types of skills. Students develop those skills necessary to complete the project they selected. Therefore, different students develop different skills and the variable-content mode is used.

Some programs operate under a combination of both the fixed and variable content modes. Certain skills are to be mastered during the program. Those skills are specified in such a way that the slowest person in the class can study them all. Additional optional skills can then be studied after completing the fixed skills. This approach is sometimes called enrichment. Some people believe that individualized

instruction can only exist if the variable content mode is used and students select the specific content they are to study. However, this is not true. Content selection is just one dimension which can be used to define individualized instruction.

The second major dimension for classifying instructional models is the time dimension. The time dimension refers to the amount of time a student is allowed to complete a particular portion of the content, regardless if the content is selected by the student or is prescribed by the educational system. If the student is given a prescribed amount of time to study a particular task, a fixed-time mode is being used. If the student is given as much time as needed to study a particular task, a variable-time mode is being used. Traditionally, educational programs have been developed using the fixed-time mode of instruction. Students have been given a prescribed amount of time to learn a task. For example, students were given six weeks to learn how to arc weld before they were asked to move on to oxy-acetelene welding.

If the students were allowed to study arc welding, either until they had developed a minimal level of skill or the level they wished to develop, they would be experiencing the variable-time mode. The amount of time a student has to study a particular piece of content is one of the most critical factors in defining individualized instruction. This is due to a change in how educators are beginning to view the learning process.

Today, many educators view a person's aptitude not in terms of potential, as it has been viewed in the past, but in terms of the speed at which a person learns. They assume that most motivated people can learn almost any content to a specified level of competency given a sufficient amount of time. John B. Corroll, in an article presented in the Teachers College Record (Corroll, 1963), defines an aptitude in terms of the speed at which a person learns a particular task. If one accepts the premise that most people can learn any content given a sufficient amount of time, it is apparent that the key to a person learning a task is time. It is also apparent

that most students can attain an expected level of competence, and therefore, it is not reasonable to assume that students will necessarily attain different levels of competence. If a student does not master a task within a certain period of time, more time should be allotted. One would expect that all motivated students could master the content if they are given a sufficient amount of time and they do not have severe physical or mental handicaps.

The last dimension useful in categorizing basic instructional models is the proficiency or competency level dimension. Instructional programs can be developed to allow different students to develop different levels of proficiency relative to a given task. Such programs can be described as variable-proficiency programs. Variable-proficiency programs are generally useful to allow people to explore a content area where the primary function of the program or course is not skill or knowledge mastery. The following example is from a career education program aimed at familiarizing people with occupations. Students who are studying about farmers and what they do may have different interests in farming. Those with a strong interest may spend a lot of time studying farming in depth. Those with a slight interest may spend a short period of time. The students with more interest will probably develop a greater proficiency in their knowledge of farming than those who are less interested. Students do not always have to master the content they study.

If a student is required to develop a prescribed amount of proficiency on a task before leaving that task, a fixed-proficiency or "mastery" mode is used. "Mastery" implies that a student has developed the expected or prescribed level of proficiency in a task. An example is the case where students in a foods preparation class must be able to prepare 100 fruit salads within an hour before leaving the fruit salads task. If they can only prepare 90 salads within an hour, they have not mastered the task, but if they can prepare 100 or more per hour they have mastered the task. Individualized vocational instruction is usually organized around the

fixed-proficiency or mastery mode. This is based on the assumption that business and industry expect to employ people who are not only familiar with a task, but who have developed a minimal level of proficiency in the task so that they can perform on the job. The owner of a garage employing auto mechanics does not want to hire a transmission specialist who has a slight familiarization with automatic transmissions. He wants to hire a person who he can count on to repair automatic transmissions. Many industrial arts classes are organized using a combination of fixed and variable proficiency modes. Certain selected skills such as safety must be mastered. Students only need to become acquainted with other skills.

Therefore, it is possible to organize an instructional program using any of the eight instructional models represented by cells of the matrix in Figure 1 and presented in Table 1. They represent all possible combinations of the content, time and proficiency levels. The specific model that you would select is dependent upon the goals of your program and how you feel people learn.

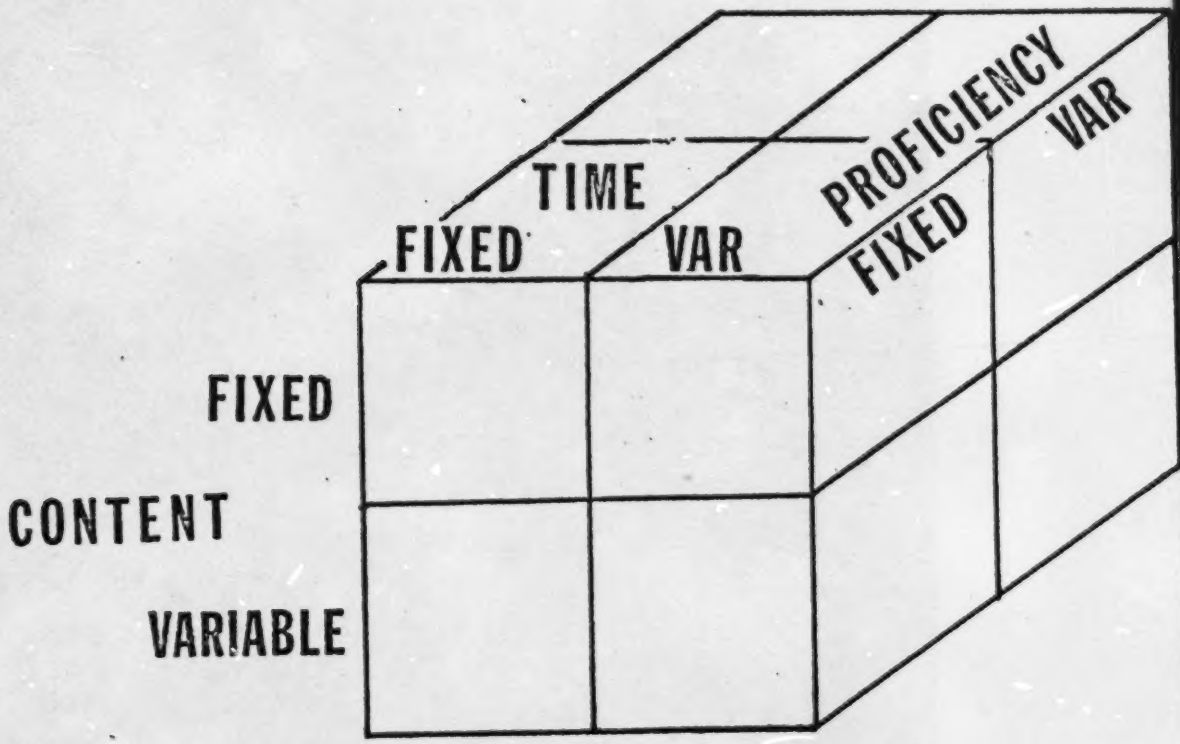
Table 1

Eight Models of Instruction

	*1. Fixed-content, fixed time, fixed-proficiency
("traditional" model)	2. Fixed-content, fixed-time, variable-proficiency
(model recommended for vocational education) →	3. Fixed-content, variable-time, fixed-proficiency
	4. Fixed-content, variable-time, variable-proficiency
(individualized instruction models)	5. Variable-content, variable-time, fixed-proficiency
	6. Variable-content, variable-time, variable-proficiency
	7. Variable-content, fixed-time, fixed-proficiency
	8. Variable-content, fixed-time, variable-proficiency

*Model is not feasible

EIGHT INSTRUCTIONAL MODELS



The first model (fixed-content, fixed-time, fixed proficiency) is not feasible or practical because it provides no means to account for individual differences, which are always present among individuals. The only circumstances under which such a model would work is if all students learned a particular task to the same level of proficiency at the same speed. Since students are different and have different aptitudes, they learn a task at different rates of speed. If the time to learn a specific task is fixed, it is not possible for all students who wish to study the task to reach the same level of proficiency unless the time is set at the time it would take the slowest students to master the task. This is not reasonable because everyone else would have to wait for the slowest person before they could move on.

Each of the other instructional models is feasible because they in some way account for individual differences. At least one of the three characteristics of each model is allowed to vary.

The second model (fixed-content, fixed-time, variable-proficiency) is generally considered to be the "traditional" instructional model because it is the model typically used in education in the past. The same content is presented to all students during a specified period of time, resulting in variable proficiency among individuals. This model produces a continual group of failures as a by-product, because it does not allow for individual differences; it just describes them and magnifies them. The characteristics of this model were described earlier.

Models 3 through 8 are feasible individualized instruction models because they all provide for combinations of content to be studied, time to study the content, and proficiency levels which allow for individual student differences in such a way that each student can attain the expected level of proficiency.

Model number 3 (fixed-content, variable-time, fixed-proficiency) is the model used most often in individualized vocational education. The main objective of such a model is to assist all students who wish to develop certain skills with the development of those skills, regardless of the amount of time it takes each individual to

master the tasks. The tasks contained in the instructional program are usually identified by examining what people must be able to do and know in order to perform on the job. These tasks then become the content for the program and the courses included in the program. In vocational education the content is derived from business or industry. Since the content is derived from an occupation and it is assumed that people enrolled in the program wish to enter the occupation, the content is fixed. Students who enter the vocational program to preform the occupation do so with the expectation that upon completing the program, they will be competent to perform at entry level jobs in the occupation. Therefore, it is not only essential to provide students with experience with each of the tasks or acquaintance with the knowledge, but it is important to be able to certify that they have mastered the skills and knowledge and are able to perform satisfactorily.

Model 4 (fixed-content, variable-time, variable-proficiency) would be used in a situation where you wanted all students to explore a body of content but you did not care how much they studied or mastered it. This model could be used in a career education program where all students should have acquaintance with each of the fifteen clusters but they do not have to master any of them or study each of them for a prescribed amount of time. It could also be used in an industrial arts program with similar goals.

Model 5 (variable-content, variable-time, fixed-proficiency) is used where you allow a student to select the content but they must master that content. The student can take as much time as needed to master the task selected.

Model 6 (variable-content, variable-time, variable-proficiency) is sometimes thought of as the "free school model". It is used where students are allowed to select the content, to study it for as long as they want, and to develop the proficiency level they desire. These last two models are generally used with courses designed to allow students to explore. Model 5 is used when students are allowed to

explore a few areas but they must master them. Model 6 is used when students can explore as many areas as they have time for but they do not have to master them.

Model 7 (variable-content, fixed-time, fixed-proficiency) is used where students can select content but must master the content they selected within a prescribed amount of time. This model is almost as impossible as the first model. It can only work if the students select tasks or projects which they are sure they can master within the amount of time allowed.

Model 8 (variable-content, fixed-time, variable-proficiency) is used where students can select content but must study the content they selected for a prescribed amount of time. Some industrial arts general shop programs are organized this way. Students select a project and have a prescribed amount of time to work on it. After that amount of time they move on to something else.

The importance of understanding the differences in these models relates to how one plans a course and how it is described to others. People talk about an individualized program as though it is unique and there is only one kind. There are many kinds. Many of the texts which have been written on the subject have been written by people in elementary education or use elementary education examples. When industrial educators try to follow the methods described they find many of them to be impossible. That is because the elementary education models usually are models not appropriate for skill development while many industrial educators believe that students should develop a set of skills in their programs.

The models described in this paper also allow industrial arts and trade and industrial educators to better understand potential differences. Many industrial arts educators believe in variable proficiency models because they do not believe all students in industrial arts classes have to master the tasks or skills. However, trade and industrial educators usually believe that their students must be capable of becoming productive members of business and industry and must master selected tasks.

Adopting any of the instructional models as alternatives to the traditional model certainly raises concerns beyond philosophical concerns. If alternatives are adopted, changes need to be made in instructional methods and administrative methods. These changes are probably more threatening to educators than the philosophical implications. The orderly dealing with groups of individuals must give way to allowing for variations related to individuals.

Methods for accomplishing these methodological changes cannot be discussed in this paper due to time, however, they are described in detail in the text published by Charles E. Merrill Publishing Co. entitled Individualizing Vocational and Technical Instruction authored by myself and Bill Knaak.

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